

IN THE CLAIMS:

Please amend claim 1, 7-11, 13, 16 and 18-21 as follows (*a clean set of all pending claims is presented for the Examiner's convenience*):

1. (Amended) A multi-band voltage-controlled oscillator comprising:
an oscillating transistor;
a resonant circuit coupled between a base and collector of said oscillating transistor,
said resonant circuit having an inductor and a capacitor coupled in parallel with each other;
a buffer transistor coupled to an output of said oscillating transistor;
a first output port coupled to an output of said buffer transistor;
a variable-capacitance diode forming said capacitor;
a control port from which a control voltage is applied to said variable-capacitance diode;
a serial assembly having a first inductor and a second inductor coupled in series with each other for forming said inductor;
first switching means made of a semiconductor for opening and short-circuiting both ends of said second inductor;
a negative source generator coupled to the output of said buffer transistor;
second switching means for selectively switching between an output of said negative source generator and a positive source;
a mode switching circuit receiving an output frequency switching signal from an outside; and
a package including said oscillating transistor, buffer transistor, negative source generator circuit, and mode switching circuit integrated therein,
wherein said second switching means issues an output to control an opening and short-circuiting operation of said first switching means to select an oscillation output at a first output frequency and an oscillation output of a second output frequency released from said output port, the second output frequency being different from the first output frequency.

2. A multi-band voltage-controlled oscillator according to claim 1, wherein an oscillator including said oscillation transistor and said resonant circuit is of an unbalanced type.

3. A multi-band voltage-controlled oscillator according to claim 1, wherein an oscillator including said oscillation transistor and said resonant circuit is of a balanced type.

4. A multi-band voltage-controlled oscillator according to claim 1, wherein said first switching means includes a diode.

5. A multi-band voltage-controlled oscillator according to claim 1, wherein said first switching means includes a transistor.

6. A multi-band voltage-controlled oscillator according to claim 1, wherein said package includes a source port from which a positive source is supplied to said second switching means is supplied.

7.(Amended) A multi-band voltage-controlled oscillator comprising:
an oscillating transistor;
a resonant circuit coupled between a base and collector of said oscillating transistor, said resonant circuit having an inductor and a capacitor connected in parallel with each other;
a buffer transistor coupled to an output of said oscillating transistor;
a first output port coupled to an output of said buffer transistor;
a variable-capacitance diode forming said capacitor
a control port from which a control voltage is applied to said variable-capacitance diode;
a serial assembly having a first inductor and second inductor coupled in series with each other for forming said inductor;

first switching means made of semiconductors for opening and short-circuiting both ends of said second inductor;

a negative source generator coupled to an output of said buffer transistor;

second switching means for selectively switching between an output of said negative source generator and a positive source, and for releasing an output to control an opening and short-circuiting operation of said first switching means to select between an oscillation output at a first output frequency and an oscillation output at a second output frequency released from said output port, the second output frequency being higher than the first output frequency;

a mode switching circuit receiving an output frequency switching signal received from an outside;

a package including said oscillating transistor, buffer transistor, negative source generator, and mode switching circuit integrated therein;

a third inductor and a fourth inductor coupled in series with each other between a collector of said buffer transistor and a source, each of said third and fourth inductors being formed with a pattern;

third switching means for opening and short-circuiting both ends of said fourth inductor according to an output of said second switching means,

wherein said third inductor has an length of substantially $1/4$ wavelength of the second output frequency, and a composite pattern of said third and fourth inductors has a length of substantially $1/4$ wavelength of the first output frequency.

8. (Amended) A multi-band voltage-controlled oscillator comprising:

a first oscillating transistor;

a resonant circuit coupled between a base and collector of said first oscillating transistor, said resonant circuit having a first inductor and a first capacitor coupled in parallel with each other;

a first buffer transistor coupled to an output of said first oscillating transistor;

a first variable-capacitance diode forming said first capacitor;

a serial assembly having a second inductor and third inductor coupled in series with each other for forming said first inductor;

first switching means made of semiconductors for opening and short-circuiting both ends of said second inductor;

a negative source generator coupled to an output of said first buffer transistor;

second switching means for selectively switching between an output of said negative source generator and a positive source, and for releasing an output to control an opening and short-circuiting operation of said first switching means to select between an oscillation output at a first output frequency and an oscillation output at a second output frequency released from said first buffer transistor, the second output frequency being higher than the first output frequency;

a mode switching circuit receiving an output frequency switching signal from an outside;

a second oscillation transistor;

a parallel assembly coupled between a base and collector of said second oscillating transistor, said parallel assembly having a fourth inductor and a second capacitor coupled in parallel with each other;

a second buffer transistor coupled to an output of said second oscillation transistor;

a second variable-capacitance diode forming said second capacitor

a control port through which a control voltage is applied to said first and second variable-capacitance diodes; and

a package including said first and second oscillating transistors, first and second buffer transistors, negative source generator, and mode switching circuit integrated therein,

wherein said mode switching circuit, according to the output frequency switching signal from the outside, selects between an output from said first buffer transistor and an output from said second buffer transistor.

9.(Amended) A multi-band voltage-controlled oscillator according to claim 8,
wherein a ratio of the second frequency to the first frequency is not greater than 1.2,
and

wherein a ratio of a third frequency released from said second buffer transistor to the
first frequency is not smaller than 1.5.

10.(Amended) A multi-band voltage-controlled oscillator according to claim 8,
wherein an oscillating operation of said second oscillating transistor is turned off when
an output is released from said first buffer transistor, and

wherein an oscillating operation of said first oscillating transistor is turned off when
an output is released from said second buffer transistor.

11.(Amended) A multi-band voltage-controlled oscillator according to claim 8, further
comprising a logical adder circuit for calculating a logical addition of outputs of said first and second
buffer transistors.

12. A multi-band voltage-controlled oscillator according to claim 10, further comprising
a PLL circuit coupled to an output of said logical adder circuit, said PLL circuit being integrated in
said package.

13.(Amended) A multi-band voltage-controlled oscillator comprising:
an oscillating transistor;
a resonant circuit coupled between a base and collector of said oscillating transistor,
said resonant circuit having an inductor and a capacitor coupled in parallel with each other;
a buffer transistor coupled to an output of said oscillating transistor;
a first output port coupled to an output of said buffer transistor;
a variable-capacitance diode forming said capacitor;

a control port from which a control voltage is applied to said variable-capacitance diode;

a serial assembly forming said inductor; said series assembly having a first inductor and a second inductor;

first switching means made of a semiconductor for opening and short-circuiting both ends of said second inductor;

a negative source generator coupled to as output of said buffer transistor;

second switching means for selectively switching between an output of said negative source generator and a positive source, and for releasing an output to control an opening and short-circuiting operation of said first switching means to select between an oscillation output at a first output frequency and an oscillation output at a second output frequency released from said first output port, the second output frequency being higher than the first output frequency;

a mode switching circuit receiving an output frequency switching signal from an outside;

a package including said oscillating transistor, buffer transistor, negative source generator, and mode switching circuit integrated therein;

a first capacitor coupled in series or parallel with said variable-capacitance diode; and third switching means coupled between both ends of said first capacitor,

wherein said third switching means makes frequency sensitivities at the first and second output frequencies substantially equal to each other by an opening and short-circuiting operation thereof.

14. A multi-band voltage-controlled oscillator according to claim 13, further comprising a second capacitor coupled in series with an assembly having said variable-capacitance diode and first capacitor.

15. A multi-band voltage-controlled oscillator according to claim 13, a second inductor coupled between two portions into which said first inductor is divided, said portions each having substantially an equal inductance.

16.(Amended) A multi-band voltage-controlled oscillator according to claim 13, further comprising a third capacitor coupled in parallel with said variable-capacitance diode.

17. A multi-band voltage-controlled oscillator according to claim 13, wherein said first and second inductors are formed with patterns.

18.(Amended) A multi-band voltage-controlled oscillator according to claim 17, wherein after trimming said first inductor to adjust the second output frequency, said second inductor is trimmed to adjust the first output frequency.

19.(Amended) A multi-band voltage-controlled oscillator according to claim 18, further comprising:

a multi-layer substrate including said first and second inductors formed therein; and
a grounding pattern formed at said multi-layer substrate, said grounding pattern being not formed at a portion over which at least one of said first and second inductors is formed.

20.(Amended) A multi-band voltage-controlled oscillator according to claim 18, further comprising:

a multi-layer substrate including an inductor formed therein; and
a via-hole formed in said multi-layer substrate for exposing a portion of at least one of said first and second inductors to a surface of said multi-layer substrate,
wherein at least one of the first and second output frequencies can be adjusted by trimming said portion exposed to said surface of said multi-layer substrate.

21.(Amended) A multi-band voltage-controlled oscillator according to claim 13,
wherein said third switching means includes a first switching diode coupled between
both ends of said first capacitor,
wherein said first switching means includes a second switching diode coupled between
both ends of said second inductor, and
wherein a voltage generated in said package is applied to said first and second
switching diodes to control opening and short-circuiting operations of said third and first switching
means, respectively.

22. A multi-band voltage-controlled oscillator according to claim 13, wherein said first
inductor is formed with a single inductor.

204770 2293650